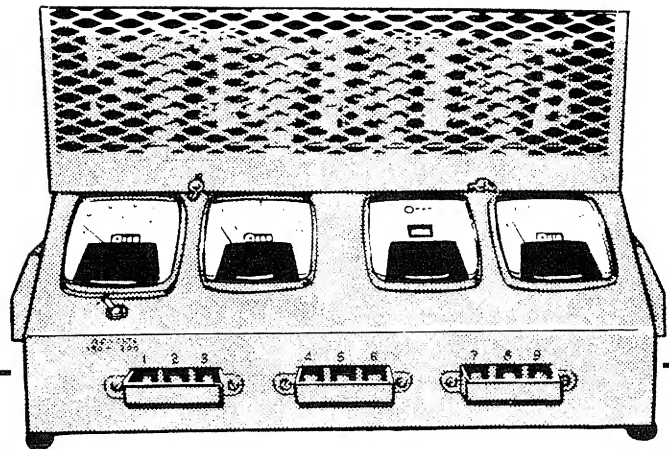




Operator's Manual

5 kW

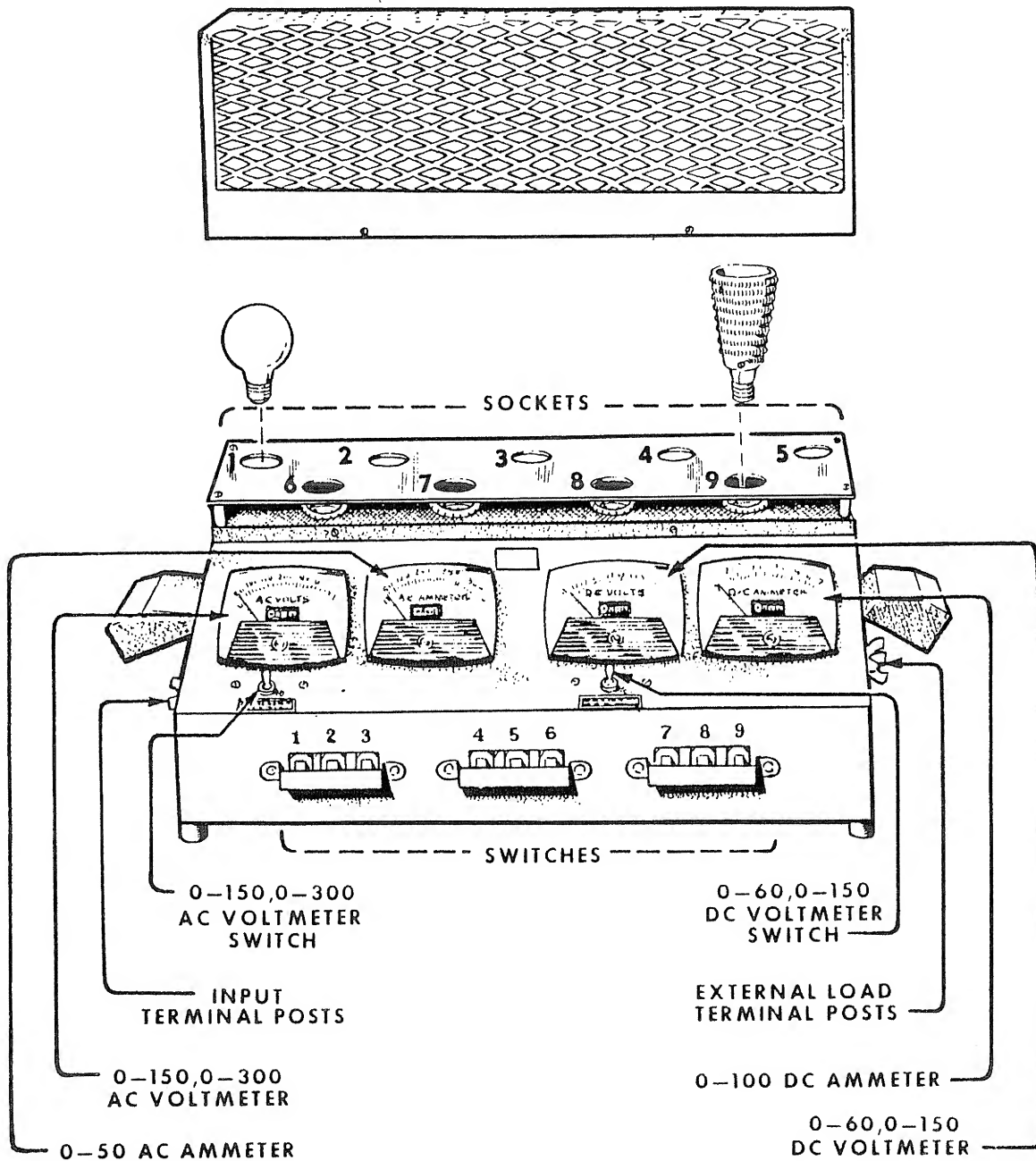
**Load
Test
Panel**



913-0006

3-80

Printed in U.S.A.



MODEL 420-0383

LOAD TEST PANEL

GENERAL

Load-test panels specially designed for use by Onan distributors and dealers selling and servicing Onan generating sets, are indispensable tools for troubleshooting or testing generator sets under realistic load conditions. See Figure 1.

Load-test panels offer a resistive load, therefore when used on AC generator sets, only the unity power factor load can be considered.

Suggested uses for the four models available are—

1. Checking available generator set output.
2. Making proper adjustments on engine-generator sets.
3. Diagnosing troubles.
4. Sales demonstrations.

There are four load-test panels, available in the following configurations:

Nine numbered sockets for load elements or lamps are individually switched, and numbered accordingly. The proper combination of elements and switches will provide a maximum load of 5400 watts at either 120 or 24 volts or 3600 watts of load at 32 volts.

The 32 volt elements have comparatively large resistance wire, while the 120 volt elements have much smaller resistance wire. If testing 240 volt generators, 240 volt heat elements must be used.

Connector leads are not supplied with load-test panel, but are optionally available. See parts list at end of book.

CONNECTING LOAD-TEST PANEL

Before connecting Load-Test Panel, make sure that proper elements are installed according to Table 1. Zero meters if necessary by turning the zero adjusting screws on front of meters. Select all switches to OFF position. Proceed with connection as follows. See Figure 1.

1. Shut down engine.
2. Disconnect all loads from generator set.
3. Connect the Load-Test Panel leads between the generator and panel input posts, being careful to observe polarity. On battery charging sets connect the Load-Test Panel to the battery terminal posts, then disconnect battery after unit is started. For 3-phase units, see Figure 2.

	420-0383	420-0384	420-0385	420-0386
AC voltmeter (0 to 150 and 0 to 300-volt scales)	x	x	x	
AC ammeter (0 to 50-ampere scale)	x	x	x	
DC voltmeter (0 to 60- and 0 to 150-volt scales)	x			
DC ammeter (0 to 100-ampere scale)	x			
Frequency meter			x	
AC voltmeter range selector switch	x	x	x	
CD voltmeter range selector switch	x			
Nine numbered sockets and switches for elements or lamps	x	x	x	x
Two input terminal posts	x	x	x	x
Two external load terminal posts	x	x	x	x
1 set (9) of heating elements for testing 32-volt generators	x			
1 set (9) of heating elements for testing 110- to 120-volt generators	x	x	x	x
Ammeter shunt 100-ampere	x			

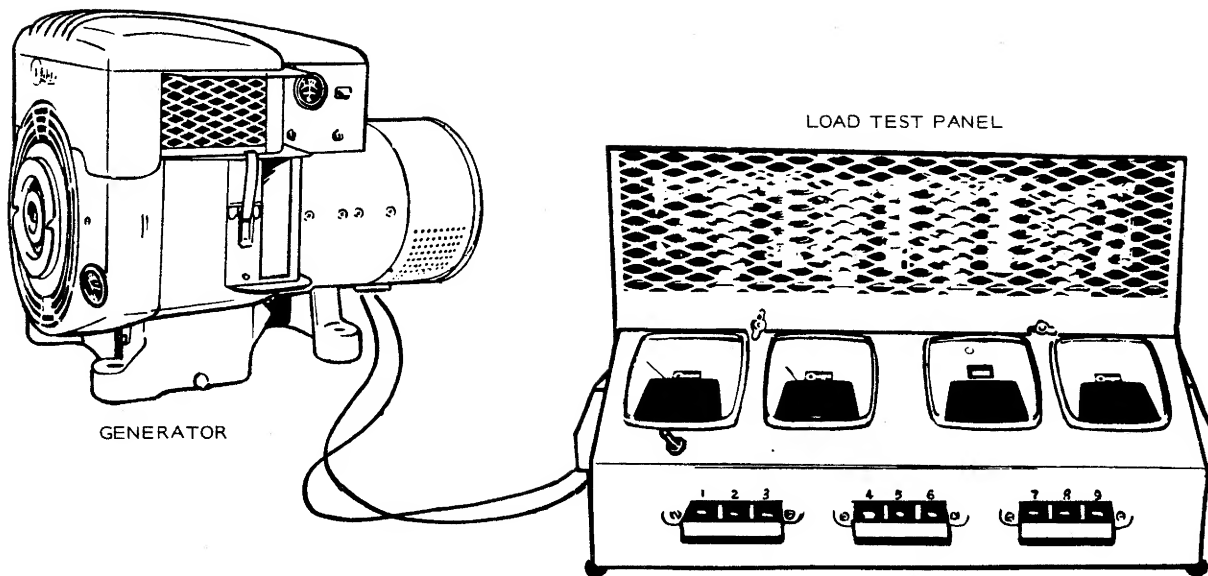


FIGURE 1. CONNECTING LOAD TEST PANEL

Load is applied incrementally through selection of the Load Panel switches and is measured on the panel meters.

To calculate applied load in watts, multiply voltmeter reading.

i.e., Voltmeter reading 120-volts

Ammeter reading 10-amps

Watts = Volts x Amps; $120 \times 10 = 1200$ watts

This method of calculating watts is true for all DC and non-inductive AC loads. Load-Test Panels supply a resistive load up to 5400 watts (5.4 kW). To increase this load, use an additional Load-Bank panel. This also supplies a 5.4 kW load and should be connected as shown in Figure 3.

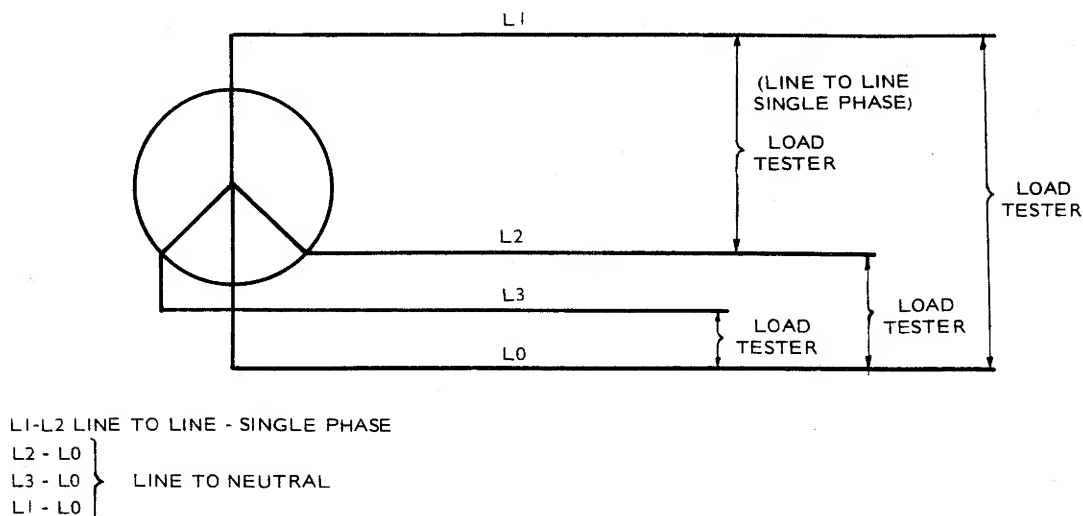


FIGURE 2. 3 PHASE CONNECTION

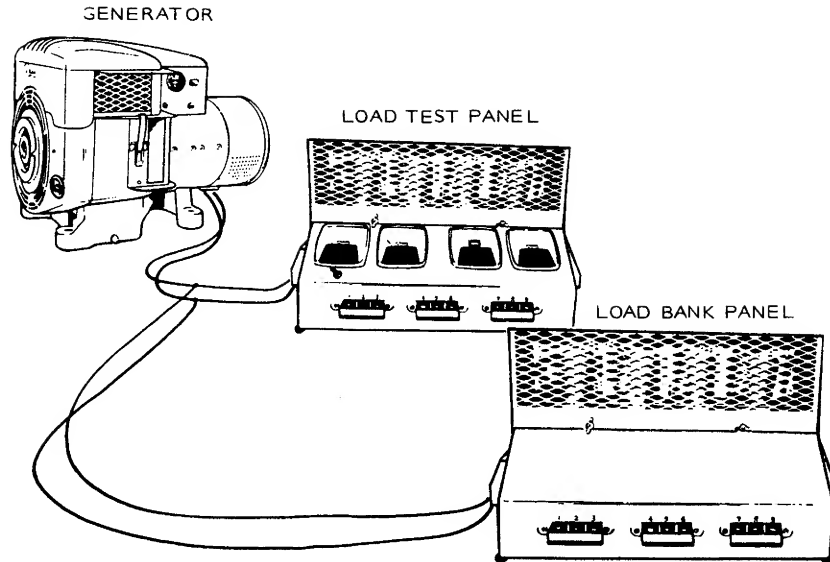


FIGURE 3. CONNECTING LOAD TEST & LOAD-BANK PANELS

SPEED AND VOLTAGE REGULATION

Where governor-controlled engine speed regulates voltage level, accuracy of regulation can be determined, using the Load-Test Panel. With the panel connected to the set as in Figure 2 or 3, all panel switches OFF, proceed as follows:

1. Start the engine. Do not make any adjustments until the set has reached operating temperature (approximately 15 minutes running).
2. When the engine is warm, select appropriate scales on meters and check generator voltages at no-load and full-load. Note whether results are within limits shown in the set manual or nameplate.
3. If both no-load and full-load voltages are higher or lower than the rated no-load and full-load, correct by adjusting governor speed control.
4. If no-load voltage and speed are correct but drop excessively when load is applied, make sure that engine power is adequate before attempting governor adjustment.

If set has a hand throttle, voltage/speed adjustments will be made by this means. Do not exceed engine maximum rated rpm.

EXTERNAL LOAD, MEASUREMENT

Use the Load-Test Panel to measure external load as follows:

1. Connect panel. All switches OFF. (See Figure 4.)

2. Start engine.
3. When engine warms up (15 minutes) apply loads to be measured. Load current is measured on the ammeter. Calculate wattage of load.

FULL POWER TESTING

Full rated output of the generator is limited to the maximum power obtainable from the engine and can be checked as follows:

1. Connect Load-Test Panel. All switches OFF.
2. Run engine until warm (15 minutes); disconnect battery if necessary.
3. Gradually apply load and increase engine speed until engine is at full throttle and generator is delivering full rated output. Voltmeter reading should be within the range specified in the manual. For example, on a 120-volt set voltage should be 114 to 120 volts.
4. Calculate the maximum wattage output of the generator (Volts x Amps) and compare the result with wattage rating of the unit. If calculated power is less than rated power, refer to the engine manual for carburetor and governor adjustment.

After making the necessary adjustments, repeat the test and recalculate maximum power output.

Model 420-0385 has an AC voltmeter, AC ammeter and a frequency meter. When performing the above test, the maximum-power rpm of the unit will be determined at the point when the frequency meter reads 60 hertz.

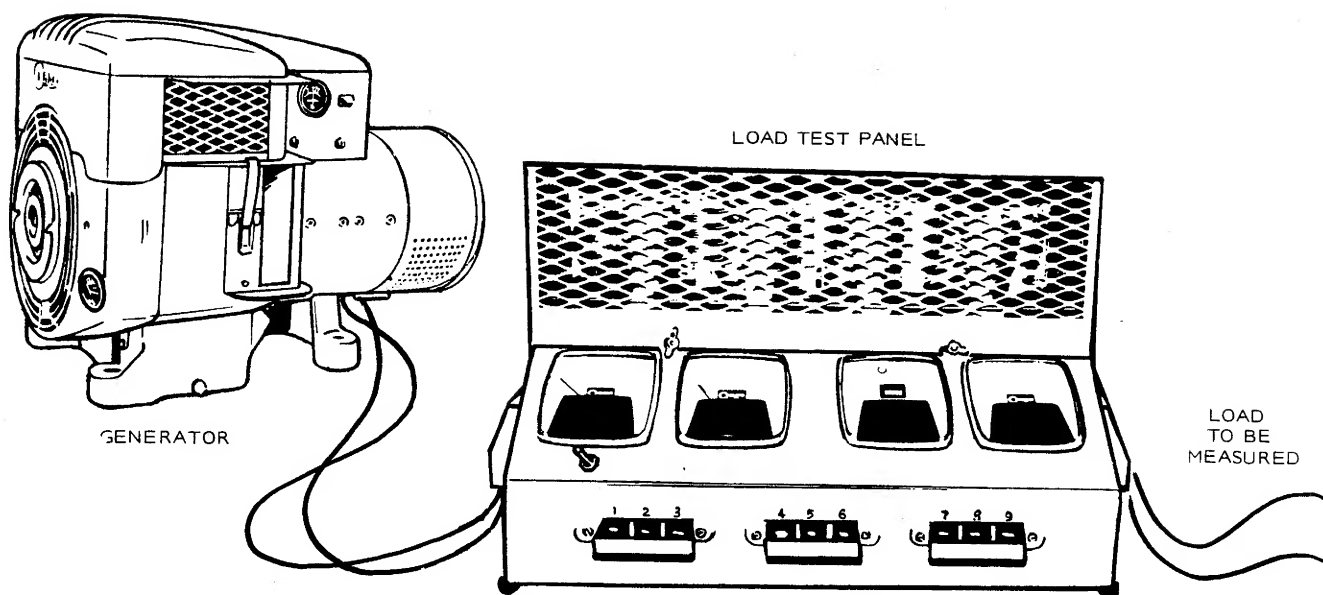


FIGURE 4. EXTERNAL LOAD MEASUREMENT

Before generator sets leave the factory, they are adjusted to produce rated voltage at full load and normal operating temperature. The speed is so regulated that the no-load voltage will not exceed the full load voltage by more than 10 percent with unity power factor load. This is considered good operating practice for inherently regulated sets and will compare favorably with the voltage regulation of most commercial power circuits. This regulation is suitable for all lighting, motor and appliance loads. If closer voltage regulation is required for equipment such as radio transmitters and X-ray equipment, consult the *factory sales department* for price quotations on special generator sets equipped with automatic voltage regulators. When requesting this information, detail size of generator set required, voltage limits to be maintained, etc.

The following arrangement of elements is recommended for greatest convenience and flexibility of load.

Obtain the speed and voltage regulation data for the set being tested from the generator instruction manual. If the overall operation of the set is satisfactory, the mere fact that it fails by some small margin to fall between the limits of speed and voltage given in the manual probably is not important. Some sets have been built to customers' specifications and may have speeds and voltages outside these limits. If there is any doubt about the normal speed and voltage limits of any set, definite information may be secured by writing to the *factory* and giving the complete Model, Spec, and Serial No. of your set.

On Load-Bank units use either the same arrangement of elements in Table 1, or install nine 600 watt elements for a total of 5400 watts.

TABLE 1. ARRANGEMENT OF HEATING ELEMENTS IN SOCKETS

Socket No.	When Testing 120-Volt Systems	When Testing 32-Volt Systems
1	50 watt, 120-volt Bulb	64-volt, 400 watt Element
2	240-volt, 600 watt Element	45-volt, 400 watt Element
3	120-volt, 300 watt Element	32-volt, 400 watt Element
4, 5, 6, 7, 8, 9	120-volt, 600 watt Element	32-volt, 400 watt Element

SALES DEMONSTRATION

Load-Test Panels can be used for making sales demonstrations. Proceed in the following manner:

1. Connect Load-Test Panel and Load Demand Panel as shown in Figure 5. Panel switches OFF.
2. Start engine and allow set to warm up.
3. Apply loads in varying increments to demonstrate—
 - a. Smoothness of engine operation at all loads.

- b. Immediate response of governor control to loads.
 - c. Ability of engine to maintain load without laboring.
 - d. Reserve power of set above rated capacity.
4. Switch all loads OFF and shut down engine.
 5. Select a 50 watt load switch to ON. This will demonstrate that the set will start automatically when a load is applied and will shut down when the load is removed.

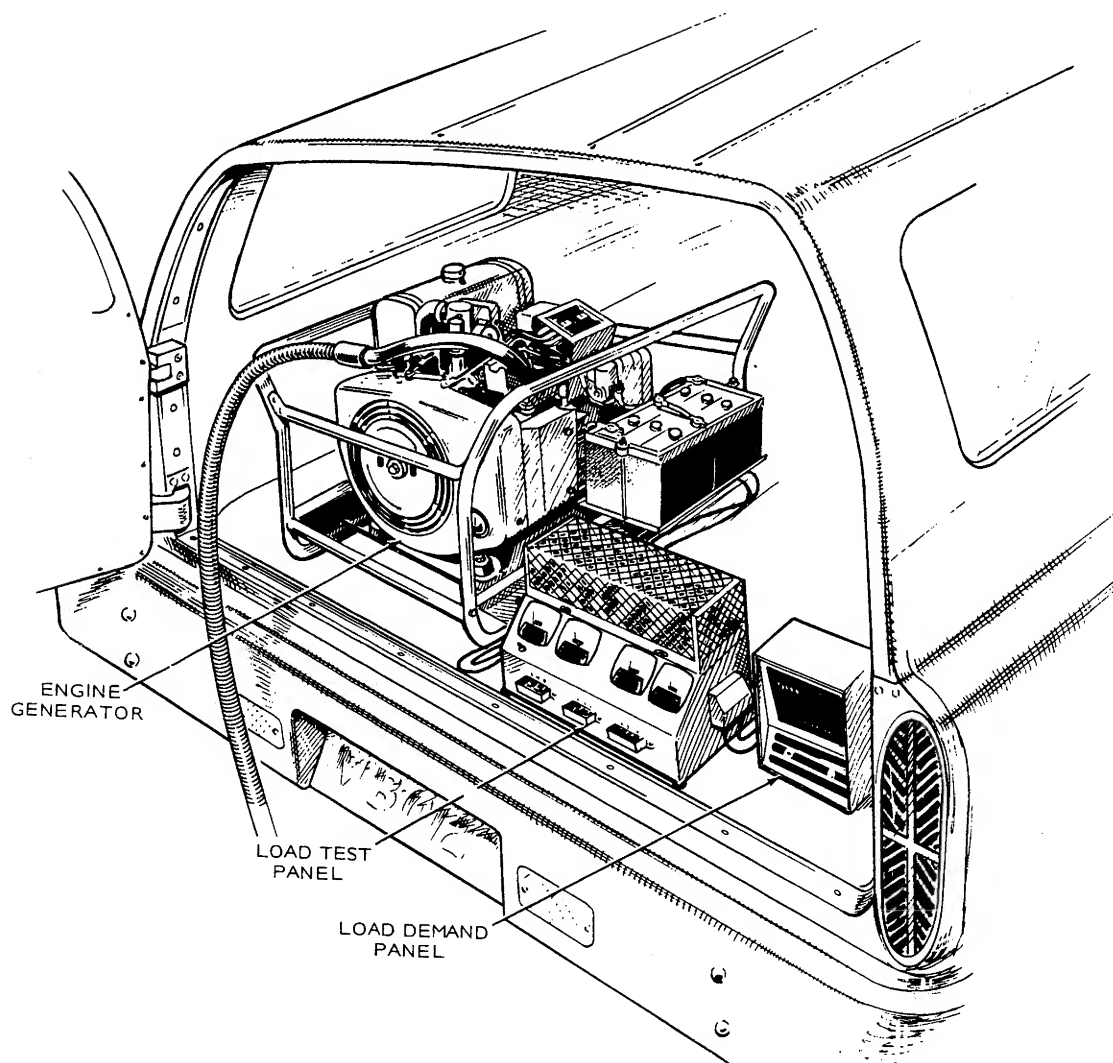
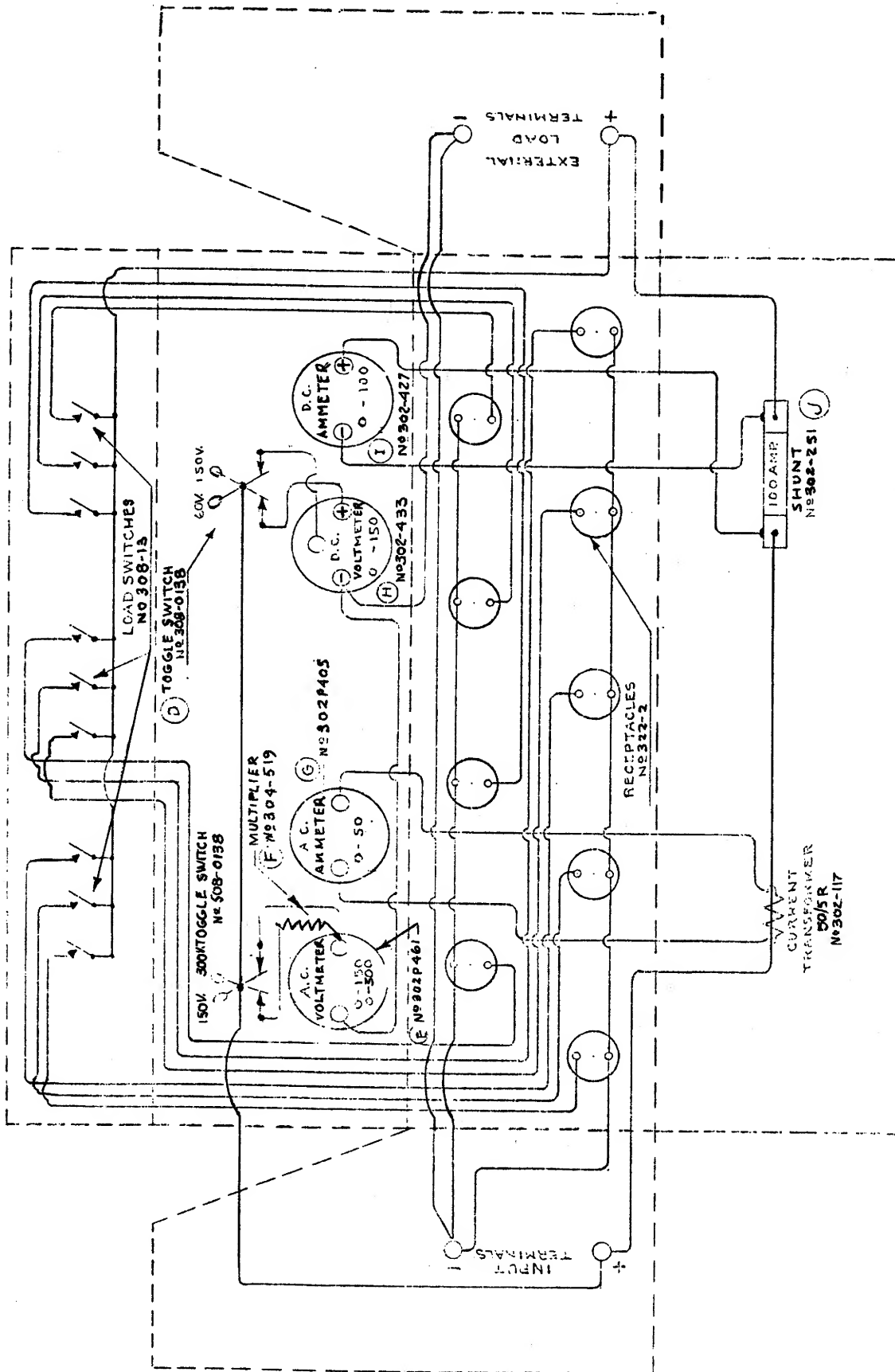
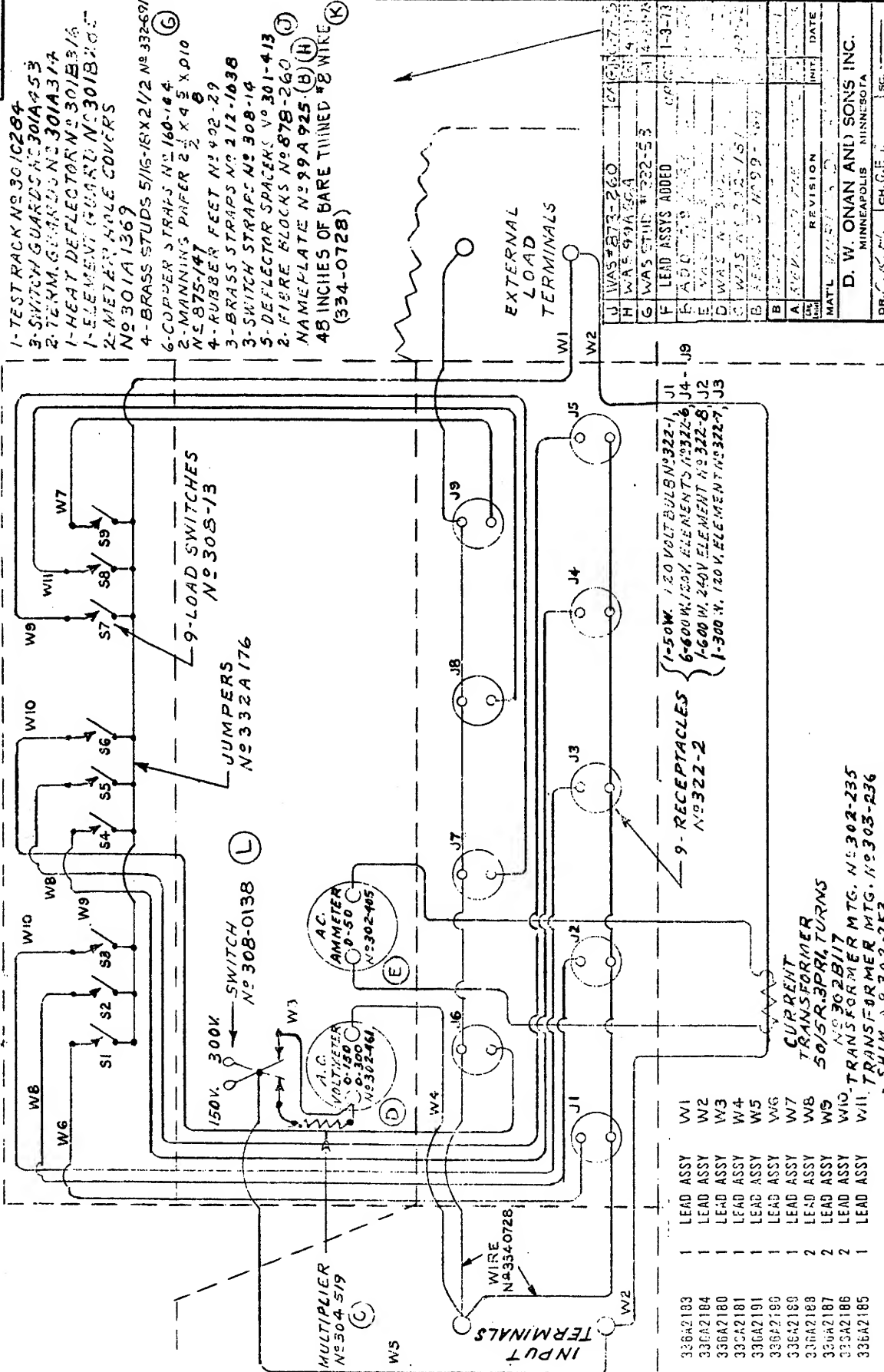


FIGURE 5. SUGGESTED SALES DEMONSTRATION

BOTTOM VIEW



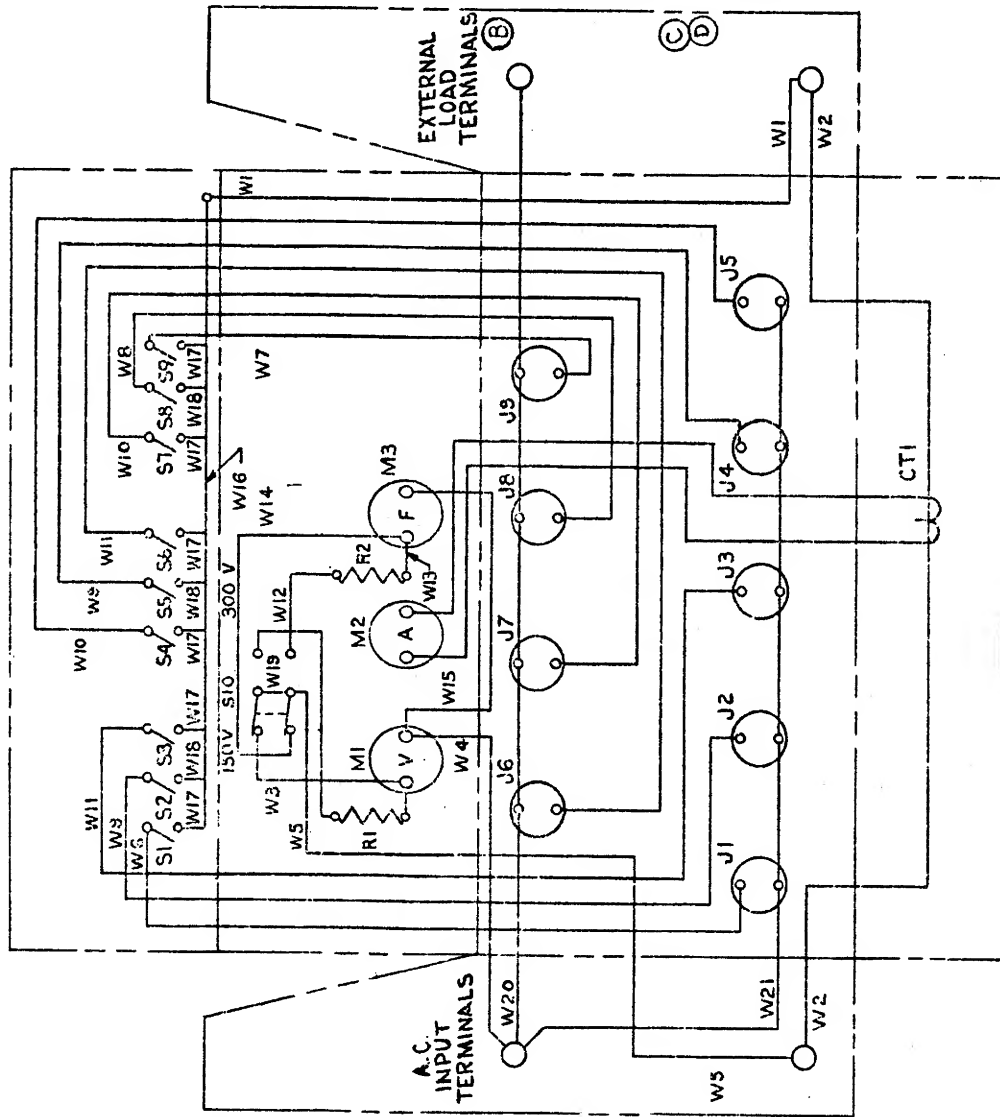
PANEL No 301C284
 SILK SCREEN NO. 98B1941 (H)
 MODEL 420-0383
 DELUXE LOAD TEST PANEL



MODEL 420-0384
 ECONOMY AC PANEL
 PANEL-AC, LOAD (ECONOMY)
 DATE 12-13-55
 DING. NO. 625-0128 B
 ✓ ✓ ✓ ✓
 \$3 50 PARTS PO

REF. DES.	PART NO.	QTY.	DESCRIPTION
CT1	302117	1	TRANSFORMER - CURRENT 50/5 RATIO 3PR. 1
	302-235	1	POINT - TRANSFORMER
	302-236	1	POINT - TRANSFORMER
	302-233	1	SHIM
J1-9	322-2	9	RECEPTABLES
M1	302-431	1	VOLTMETER 0-150/0-300
M2	302-405	1	AMMETER 0-50
M3	302213	1	METER - FREQUENCY 60 CY
R1	304-519	1	RESISTOR MULTIPLIER
R2	304A125	1	RESISTOR - MULTIPLIER, 1500-OHM, 25 W.
SI-9	308-13	9	SWITCH - LOAD
W16	332A176	1	WIPPER - COPPER
SI0	300-68	1	SWITCH OUTPUT
	517-15	1	DO. PLUG
	301C284	1	BACK - TEST
	301A453	3	GUARD - SWITCH
	301A314	2	GUARD - TERMINAL
	301B316	1	REFLECTOR - HEAT
	301B265	1	GUARD - ELEMENT
	301A1369	1	COVER - METER HOLE
	332-91	4	STUD - BRASS, 5/16-18X2 V2 LG
W17	160-144	6	STRAP - COPPER
	875-147	2	WANNING PAPER - 7-1/2 X 4-5/8 X .010
	402-29	4	WIPPER FEET
W18	212-1038	3	STRAP - BRASS
W19	308-14	3	STRAP - SWITCH
	301-413	5	DEFLECTOR - SPACER
	876-200	2	BLOCK - FIBRE
	89A325	1	NAMEPLATE
W20-21	* 334-0725	2	* 8 BARE TINNED WIRE 24"
	322-1	1	BULB - 120V, 50 W. (J1)
	322-6	6	ELEMENT - 120V, 600 W. (J4-9)
	322-8	1	ELEMENT - 240V, 600 W. (J2)
	322-7	1	ELEMENT - 120V, 300 W. (J3)

* BULK



336A2183	1	LEAD ASSY	W1	336A2188	2	LEAD ASSY	W9
336A2184	1	LEAD ASSY	W2	336A2187	2	LEAD ASSY	W10
336A2180	1	LEAD ASSY	W3	336A2186	2	LEAD ASSY	W11
336A2181	1	LEAD ASSY	W4	226A383	1	LEAD ASSY	W12
336A2181	1	LEAD ASSY	W5	226A1155	1	LEAD ASSY	W13
336A2190	1	LEAD ASSY	W6	336A1226	1	LEAD ASSY	W14
336A2185	1	LEAD ASSY	W7	336A2182	1	LEAD ASSY	W15
336A2185	1	LEAD ASSY	W8				

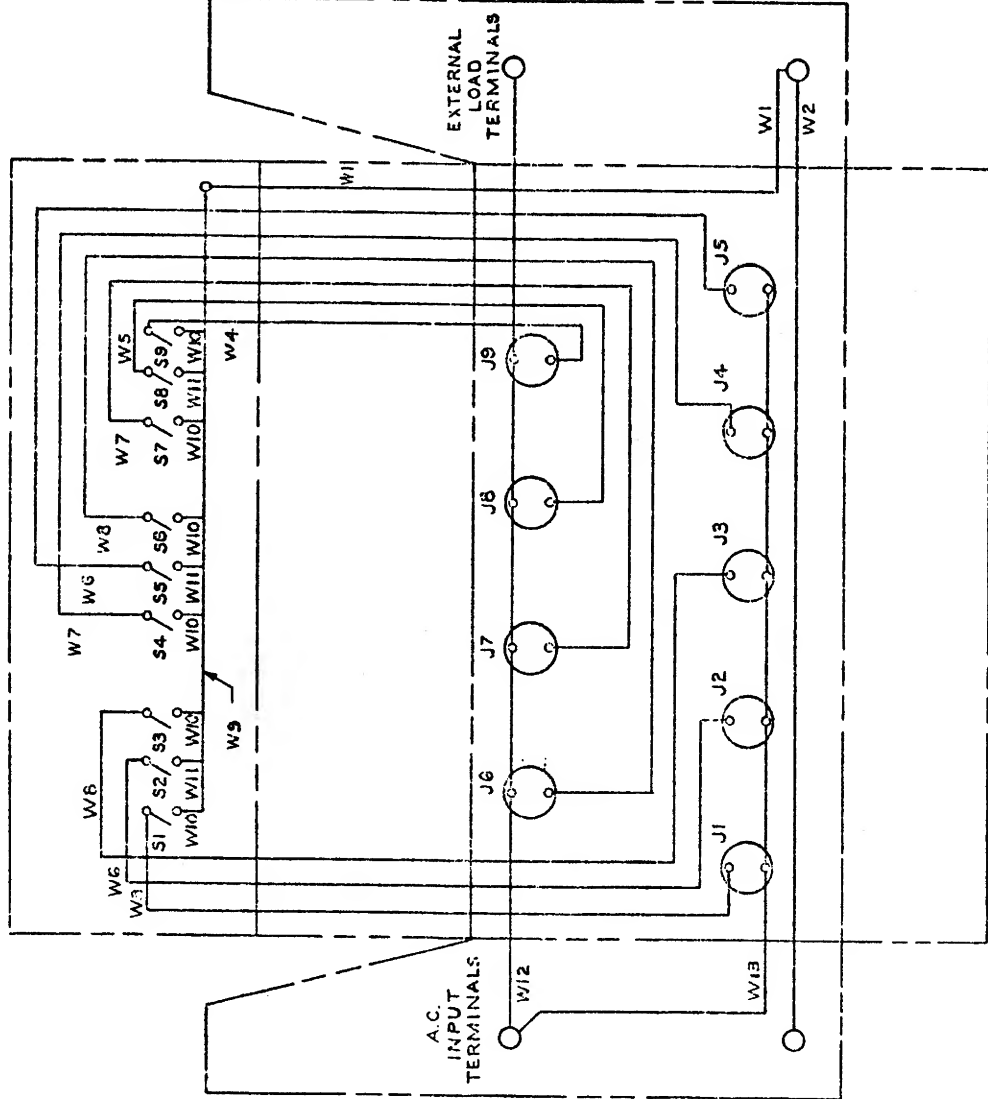
MODEL 420-0385
AC PANEL WITH FREQUENCY METER

DATE	5-7-68	BY	CFM	DATE	5-7-68
NAME	PANEL-AC LOAD (ECONOMY)				
QTY.	625-0908				
REV.	B				

DATE	5-7-68	BY	CFM	DATE	5-7-68
NAME	PANEL-AC LOAD (ECONOMY)				
QTY.	625-0908				
REV.	B				

PARTS LIST			
REF. DES.	PART NO.	QTY.	DESCRIPTION
J1-9	322-0002	9	RECEPTACLES
S1-9	308-0913	9	SWITCH - LOAD
W9	332-0176	1	JUMPER - COPPER
	517-0019	2	DOT PLUG
	301-0284	1	RACK - TEST
	301-0453	2	GUARD-SWITCH
	301-0314	2	GUARD - TERMINAL
	301-0315	1	REFLECTOR - HEAT
	301-0285	1	GUARD - ELEMENT
	301-1369	4	COVER - METER HOLE
	332-0691	4	STUD - BRASS 5/16-18 x 2-1/2LC
W10	160-0144	6	STRAP - COPPER
	675-0147	2	WARNING PAPER - 2-1/2 x 4-5/8 x .010
	402-0029	4	RUBBER FEET
W11	217-1038	3	STRAP - BRASS
	301-0413	5	DEFLECTOR - SPACER
	878-0260	2	BLOCK - FIBRE
W12-13	90-0925	1	NAMEPLATE
	334-0729	2	#8 BARE TINNED WIRE - 24"
	322-0006	9	ELEMENT - 120V, 600W, J1-9
	98-2630	1	SILKSCREEN

* BULK



336-2183	A	1	LEAD ASSY	W1
336-2184	A	1	LEAD ASSY	W2
336-2190	A	1	LEAD ASSY	W3
336-2189	A	1	LEAD ASSY	W4
336-2195	A	1	LEAD ASSY	W5
336-2186	A	2	LEAD ASSY	W6
336-2187	A	2	LEAD ASSY	W7

336-2186 A 2 LEAD ASSY W8

MODEL 420-0386
LOAD BANK (SLAVE) PANEL

C. ADDED SILKSCREEN		DATE	
W. CITY WAS 6		JULI	
A. REVISED J2, J3		3-6-73	
REVISED	DATE	DATE	
101	101	101	
DIVISION OF STUDENT CORPORATION			
MINNEAPOLIS, MINNESOTA			
DATE		DATE	
7-30-73		WALTZ	
NAME		NAME	
PANEL-AC LOAD (SLAVE)		PANEL-AC LOAD (SLAVE)	
DWG NO		DWG NO	
625-1246		625-1246	
B		B	

PARTS LIST

PART NO.	DESCRIPTION	QUANTITY USED	
		MODELS AC ONLY	AC & DC
302-0433	Voltmeter, DC, 0-60 Volt, 0-150 Volt, Replaces 302-0111		1
302-0427	Ammeter, DC, 0-100 Amp, Replaces 302-0099 (Use with Shunt 302-0070)		1
302-0461	Voltmeter, AC, 0-150 Volt, 0-300 Volt (Use with Resistor 304-0519), Replaces 302-0140	1	1
302-0405	Ammeter, AC, 0-50 Amp, Replaces 302-0116 (Use with Current Transformer (302-0117))	1	1
304-0519	Resistor, Fixed, 15.3 K 1%, 2 Watt (Use with Voltmeter 302-0461)	1	1
302-0117	Transformer, Current - 50/5A	1	1
302-0070	Shunt - 100 Amp		1
308-0068	Switch, Toggle - Voltmeter	1	2
308-0013	Switch, Toggle - Load Switch	9	9
322-0002	Receptacle, Sign - White Porcelain	9	9
—	Nut, Wing - 5/16" - 18 - Plated	4	4
322-0001	Lamp, 50 Watt - 120 Volt	1	1
322-0008	Element, Heat - 600 Watt - 240 Volt	1	1
322-0006	Element, Heat - 600 Watt - 120 Volt	6	6
322-0007	Element, Heat - 300 Watt - 120 Volt		1
322-0015	Element, Heat - 400 Watt - 64 Volt	1	1
322-0014	Element, Heat - 400 Watt - 45 Volt		1
322-0009	Element, Heat - 400 Watt - 32 Volt		7
302-0213	Meter, Frequency (60 Hertz)	1	
304-0125	Resistor, Fixed, 1500-Ohm, 125 Watt	1	
302-0213	Frequency Meter (60 Hertz)	1	
420-0301	Test Panel Lead, Red 6 Ft.	1	1
420-0302	Test Panel Lead, Black 6 Ft.	1	1

New style square-face panel meters replace old style round-face panel meters. Mounting is similar.

NOTE: Connector leads are not supplied with Load-Test Panels. Must be purchased separately.



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